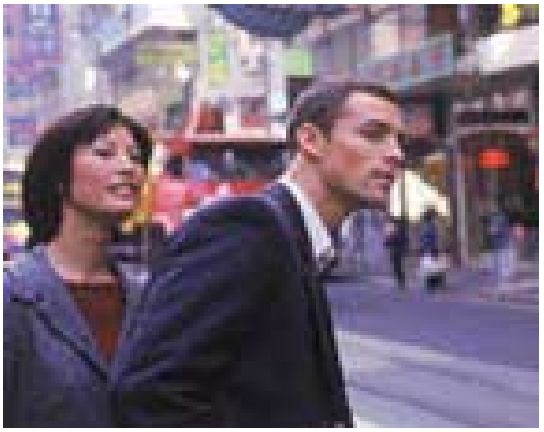
White Paper

June 2001

Mobile Phone R520 (R2A)



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PREFACE

Purpose Of This Document

The Ericsson R520 White Paper is designed to give the reader a deeper technical understanding of how the R520 is designed and how it interacts with other media. This document will make it easier to integrate the R520 with the IT and communications solutions of a company or organization.

People who can benefit from this document include:

- Corporate buyers
- IT professionals
- Software developers
- Support engineers
- Business decision-makers

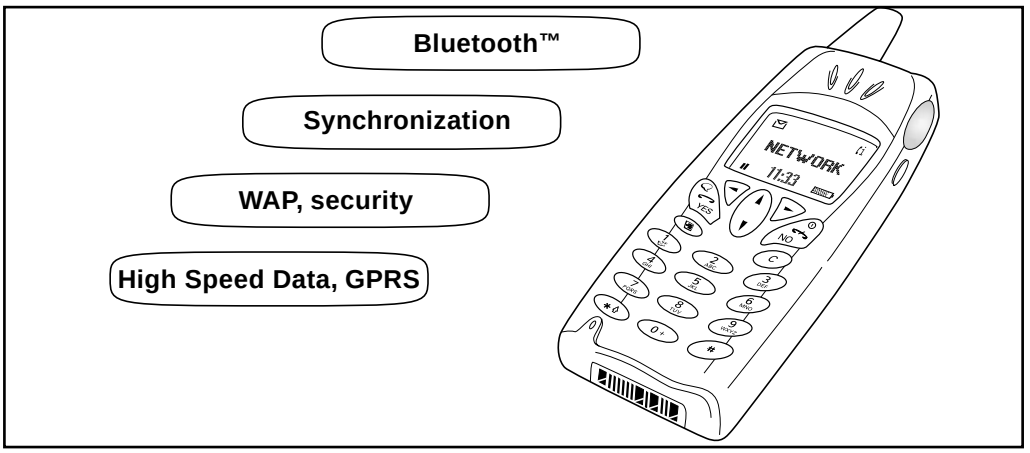
The best place to find accessories to support your phone and daily life is at Ericsson Mobile Internet, http://mobileinternet.ericsson.com. Here are downloadable ring tones, games, news, information and a host of links to other sites.

More information, useful for product, service and application developers, is published on the Ericsson Mobility World. The site, at http://www.ericsson.com/mobilityworld, contains up-to-date information about technologies, products and tools.

PRODUCT OVERVIEW

The R520 is a triple band phone with built-in Bluetooth™ wireless technology and support for High Speed Data, GPRS and WAP. It features and integrates wirelessly with personal management applications such as corporate calendars, phone books and task lists, constituting a valuable communication and organizational tool for businesses and individuals.

R520 — Always Online with the Mobile Internet



Bluetooth wireless technology

Using a high speed radio link, Bluetooth wireless technology eliminates the need for cables when connecting the R520 to other handheld devices, accessories or laptops. It provides secure short-range wireless communication even without line of sight between devices. Bluetooth wireless technology can be used to synchronize laptops and PDAs, to employ a wireless headset, to turn the phone into a wireless modem, to exchange calendar events and business cards with other phones and more.

Synchronization Synchronization with PCs, PDAs or calendars is effortless. Appointments and tasks in the R520 s calendar as well as entries in its phone book can be synchronized using infrared, a cable connection, Bluetooth wireless technology or over WAP using SyncML.

Secure WAP Internet browsing and secure mobile services are provided by WAP. The built-in browser supports WAP 1.2.1, with push services and secure transaction methods (such as digital signatures). Depending on network services, the R520 provides WAP over GPRS with a constant connection — either GSM Data or SMS.

High Speed and GPRS The R520 enables high speed data communication and WAP browsing with a constant connection. In GSM Data connections, High Speed Data supports a high transmission rate and a fast download speed. Furthermore, by supporting GPRS, the R520 is designed to remain always online, with a cost efficient IP connection enabling rapid data transmission.

Functions and Features for Productivity

Triple Band support

For using the R520 on **GSM 900, 1800 and 1900** networks — in other words, almost anywhere in the world.

Messaging

E-mail client (POP3/SMTP) and support for linked **SMS** messages. The **Data connections** feature makes it easy to manage all connection settings in one place.

Connectivity

An **infrared link** in addition to **Bluetooth** wireless technology for synchronization, turning the phone into a wireless modem and more. An optional cable can be used if infrared is not available on the PC or handheld.

Voice and user interface

Built-in **voice memo recorder** and enhanced **voice control** functions. A full graphic display with greyscales and easy-to-navigate, user interface software. **Predictive text input**, (T9▫ Text Input) makes typing quick and easy.

Profiles feature

Groups of settings preset to suit certain environment **profiles**, such as in car , meeting , home , etc. Numbered **shortcuts** make it possible to prepare settings into a favourites menu for quick and easy access.

Accessories

A wide range of Ericsson accessories are available, such as a Bluetooth **wireless headset,** to further enhance productivity.

Services on the network

The **SIM Application Toolkit** (online services) makes it possible for operators to provide new services — including new menus and functions — to users over the air. Support for **mobile positioning** enables the design and implementation of new productivity and commercial solutions.

BLUETOOTH™ WIRELESS TECHNOLOGY

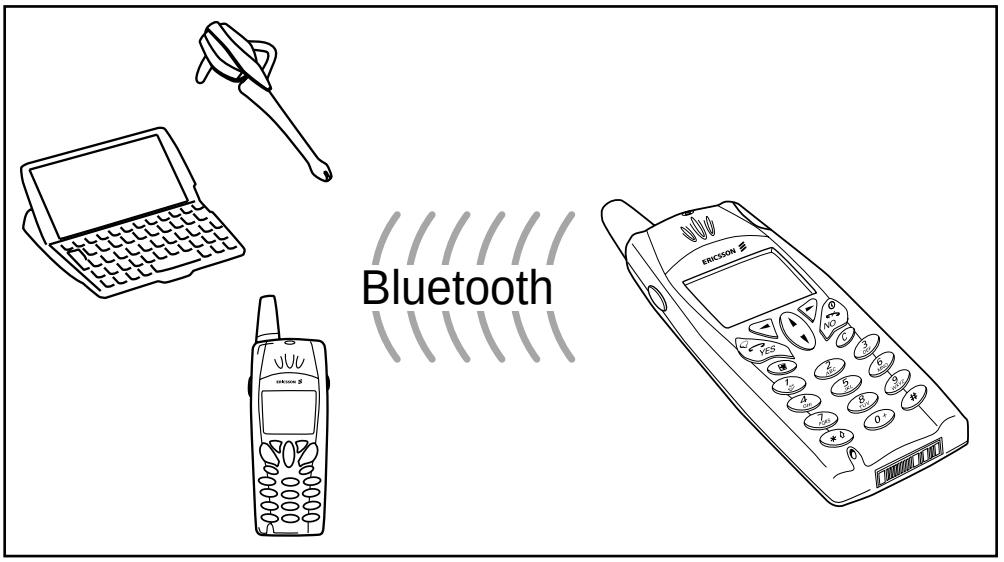
The R520 features built-in Bluetooth wireless technology. Its short-range radio link operates in the globally available 2.4 GHz radio frequency band, ensuring fast and secure communications up to a range of 10 metres. Please note that in countries where the use of Bluetooth wireless technology is not allowed, the Bluetooth function should be switched off. Contact an Ericsson representative to check if the use of Bluetooth wireless technology is restricted in your country.

Bluetooth wireless technology is designed to be fully functional, providing high transmission speeds, even in noisy radio frequency environments. All data transfer is protected by advanced error-correction methods, ensuring a high level of data security.

Bluetooth wireless technology facilitates instant connections, which are maintained even when the devices are not within line of sight. High-quality voice transmission is provided under adverse conditions, making it possible to use a headset connection to the R520 at all times.

Ericsson is a founding partner of the Bluetooth Special Interest Group (SIG). Bluetooth wireless technology devices that are expected to be available in the near future include:

- Headset for wireless voice transmission and remote call control
- PCs, laptops, PDAs, palmpads, etc.
- PC cards for Bluetooth wireless technology in laptops and PDAs
- MP3 music player
- Other phones for exchanging business cards, ring signals, playing games, etc.
- Digital still and motion video cameras
- Printers, hard disks and other storage devices
- Handheld scanners for text, barcodes and images
- Household appliances with built-in logic, as well as games and entertainment devices
- Access points in hotel lobbies and airports for connecting to computer networks and the Internet



Using Bluetooth Wireless Technology in the R520

The Bluetooth wireless technology provides rapid data transfer, active when one or more Bluetooth devices are within a range of 10 metres. Key benefits of using Bluetooth wireless technology in the R520 include the following:

Replace cable and infrared
: Bluetooth wireless technology gives a true wireless connection to headsets, computers, networks, printers and other devices.

Several devices
: The R520 identifies and maintains several devices in a pairing list.

Radio link
: No line of sight required; the phone can remain in a briefcase or in a pocket (so long as no solid objects are in between).

Secure data connection
: A Bluetooth wireless technology PC/laptop can connect to the phone, turning it into a modem for accessing the Internet and for data transfer via GSM Data or GPRS.

Synchronization
: Fast synchronization, even without line of sight, of calendar and phone book with PC/laptop and PDA, plus quick exchange of business cards, calendar events and melodies with other phones and devices.

Phone management
: Manage the phone book and the phone settings from a Bluetooth-supported PC.

Print from the phone
: When connected to a printer via Bluetooth wireless technology, the R520 can print overviews of its calendar, appointments and tasks, contacts, business cards and text messages.

GENERAL PACKET RADIO SERVICES

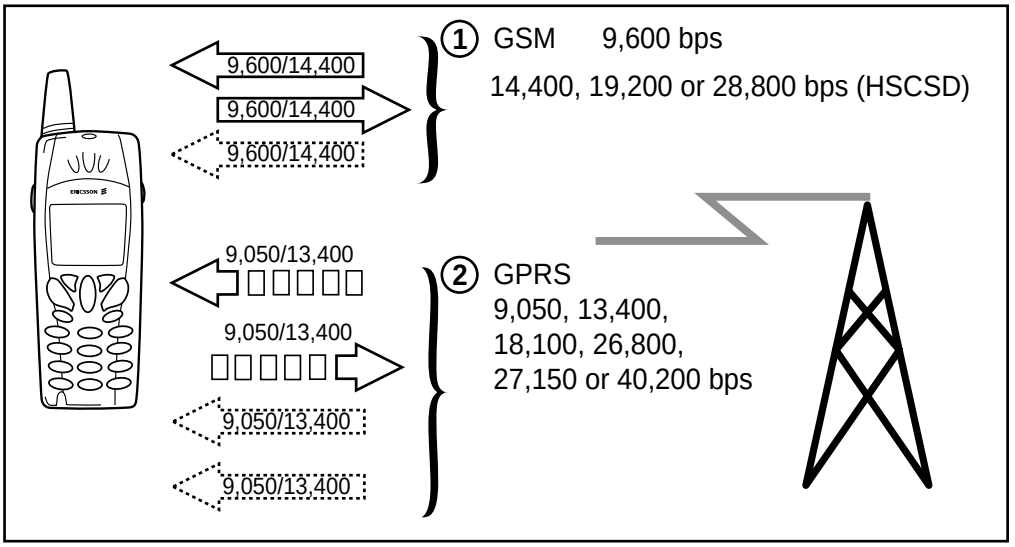
The introduction of GPRS (General Packet Radio Services) is one of the key steps in the evolution of today s GSM networks for enhancing the capabilities of data communication. Data traffic is increasing enormously (over both wired and wireless networks), with the growth in demand for Internet access and services paralleling that for mobile communications. Users want access to the Internet while they are away from their offices and homes, and surveys have found that the vast majority of business professionals want the ability to send and receive e-mail, browse the Web and transmit text and graphics on a portable device. That is why the main applications driving Mobile Internet development are e-mail clients and Web browsers.

The demand for high-speed Internet access will be the key driver for coming generations of wireless services, and GPRS can deliver the necessary speed. GPRS allows innovative services to be created, enabling new and previously inaccessible market segments to be addressed and increasing customer loyalty.

GPRS applications can be developed as both horizontal and vertical. Vertical applications are specific, including those for operations such as reaching police and emergency, taxi, delivery or automated services (vending machines, supervision, vehicle tracking). Horizontal applications are more generic and include those for Internet access, e-mail, messaging, e-commerce and entertainment.

GPRS is able to take advantage of the global coverage of existing GSM networks. Applications developed for GPRS can be deployed on a large scale and can reap the associated benefits. GPRS also provides a secure medium for connections to private networks, banking and financial services.

With GPRS, the R520 sends data in packets at a very high speed. The R520 remains connected to the network at all times, using transmission capacity only when data are sent or received.



¥1. A normal GSM call uses only one of eight repeating time slots in the GSM channel, giving a data speed of 9600 bps. The R520 supports a more efficient coding scheme, giving data speeds of up to 14 400 bps (with necessary network support). Furthermore, High Speed Circuit Switched Data (HSCSD) adds the possibility of using two time slots for receiving data, increasing the data speed to as much as 28 800 bps (network dependent).

¥2. In GPRS data are sent in packets, with up to three time slots being combined to provide the necessary bandwidth. The result is up to 40 200 bps for receiving data (depending on coding scheme).

Using GPRS in the R520

Instead of occupying an entire voice channel for the duration of a data session, the R520 sends/receives data in small packets, as needed, much like IP on the Internet. Because of this, the R520 maintains a constant online connection, its data transmission abilities summoned by the application in use on an as-needed basis.

The GPRS specification includes four coding schemes, which allow data speeds of 9050 bps, 13 400 bps, 15 600 bps and 21 400 bps. The R520 works with the first two coding schemes, although data speed naturally will vary according to network configuration.

The GSM system limits the ability to use all eight time slots, so the R520 uses up to three time slots for receiving data and one slot for transmitting. This means the speed for receiving data can reach 40 200 bps; for sending data, up to 13 400 bps.

Information about the identity of the phone and characteristics of the connection are described in the PDP context (Packet Data Protocol context). This information is stored both in the phone and in the mobile network so that each phone is identified and visible to the system. Multiple PDP context settings can be set in the R520 s menu system or by OTA provisioning.

Using GPRS with the R520 offers several distinct advantages:

Constant connection	Keep an open connection to an e-mail system or the company network, staying online to receive and send messages at all times. All connection settings can be managed by using the data connections feature.
High speed	Gain access automatically to increased bandwidth when downloading large files, images, etc.
Cost efficient	Use transmission capacity only when needed, potentially reducing costs.
WAP over GPRS	Access the Internet via WAP at high speed and with a constant connection.
E-mail over GPRS	Remain connected to an e-mail system while reading and preparing messages (which are sent at high speed).
Data communication	Transfer data and access the Internet or an intranet with a PC, PDA or handheld device connected via Bluetooth wireless technology, infrared or cable.
Data and voice	Maintain a data connection, including a constant connection to an e-mail system, when conducting a voice call.
Provide settings	Receive GPRS configuration settings from the provider over the air, precluding the need for manual configuration.
User controlled settings	Take advantage of full user control in the data connections menu, establishing multiple descriptions and accessing advanced settings for GPRS (such as those for data compression and quality of service).

WAP SERVICES

The typical WAP client is a small, portable device connected to a wireless network. This includes mobile phones, pagers, smart phones, PDAs and other small devices. Of course, compared to desktop and laptop computers, these devices are limited by user interface, low memory and low computing power.

The WAP browser in the R520 is compliant with WAP 1.2.1 and includes WTLS class 3 as well as mechanisms for digital signatures. It is designed for WML and cannot read ordinary HTML pages, but it is suitable for interaction with customer services such as, for example, ticket reservation services. It is also designed to access text-based information such as timetables, share prices, exchange rates, Internet banking and other interactive services.

Using WAP in the R520

The built-in WAP browser in the R520 gives the user portable, fast and secure access to a wide variety of services, including personalized services, with new opportunities for business, individuals and service providers:

Push services	Businesses and service providers can push content or service indications to work groups and/or customers. Examples of pushed content would be mail alerts, messaging, news, stock quotes, contacts, meeting requests, etc.
Provide settings	Using SMS infrastructure, configuration settings can be sent over the air so that the user does not need to configure the WAP access settings manually. WAP settings may also be customized by the operator.
Adapt to phone type	The User Agent Profile function allows content to be automatically optimized for the R520, ensuring that a WAP service is provided with the intended user experience.
Security	Service providers can offer information-sensitive services with a high degree of security (compliant with Wireless Transport Layer Security [WTLS] classes 1, 2 and 3). The R520 supports digital signatures and Wireless Identification Modules (WIMs).
Several bearer types	The R520 accesses WAP over a standard GSM Data connection as well as over a GPRS connection. SMS is available also as bearer type.
Bandwidth efficiency	Unlike traditional Internet services, WAP services are relayed to wireless devices as binary encoded data, maximizing bandwidth efficiency. A GPRS connection further increases efficiency.
Easy create for WAP	Creating a WAP service is no harder than creating an Internet/intranet service, as WML and WMLScript are based on well-known Internet languages such as HTML and JavaScript.
Using standard tools	Service creators can use standard tools such as ASP or CGI to generate content dynamically. Services can be created once and then made accessible to a broad range of wireless networks.
Maintain customer base	Existing Internet services can be adapted to WAP. The necessary binary encoding is handled by a WAP Gateway, allowing HTML-based services to be viewed on the WAP browser of the R520.

Improve productivity	A business can use a WAP gateway to provide a secure connection to its corporate network, improving internal communication flow by making information available to mobile as well as office users.
The WAP profiles	The R520 can store five WAP profiles, each with a group of network settings and a home page. A WAP profile holds network settings and user identification, allowing the user to switch easily between, for example, corporate services and WAP services simply by changing WAP profile.

Bearer Type Characteristics

The R520 accesses WAP services over SMS or IP. (IP can be provided over either GSM Data or GPRS, depending on network services.)

Typical differences among bearer types are listed below.

GPRS Access

- The connection is maintained constantly, with transmission capacity being used by the application in use on an as-needed basis. Data are transmitted in packets.
- Higher transmission speed than that of GSM Data or SMS access.
- Potential for volume-based tariffing, meaning that the user is charged for volume of data transmitted rather than the net duration of time the phone is connected.
- When transmitting large amounts of data, bandwidth can be increased automatically to allow faster transmission speed.
- Ideal for complex pull services, browsing, data transfer, provisioning, pager services, messaging services, information services, push initiations.

GSM Data Access

- Provides a switched-circuit connection for data transmission, which means that the phone is connected for the duration of the WAP session.
- Higher transmission speed than that of SMS access.
- Pricing is comparable to that for data calls in the network.
- Suitable for complex pull services, browsing and data transfer.
- Not suitable for provisioning, pager services.

SMS Access

- SMS point-to-point is used, not SMS Cell Broadcast.
- Connection is maintained by the automatic exchange of messages between the phone and the SMS Service Center.
- Lower transmission speed than that of GSM Data access.
- Pricing is comparable to that for normal SMS service in the network.
- Suitable for messaging services, information services, push initiations, provisioning.
- Not suitable for browsing, data transfer.

Gateway Characteristics

A WAP Gateway provides Internet/intranet as well as WAP services to the mobile browser. A gateway is identified by an IP number or by a phone number, depending on access type.

WAP Security

For certain WAP services, such as banking services, a secure connection between the phone and WAP gateway is necessary. An icon in the display of the R520 indicates when a secure connection is in use.

The R520 is based on the WAP 1.2.1 specification suite, in which security functionality is specified by a technology called Wireless Transport Layer Security (WTLS). The WAP protocols for handling connection, transport and security are structured in layers, with security handled by the WTLS layer, operating above the transport protocol layer. WTLS classes define the levels of security for a WTLS connection:

- WTLS class 1 involves encryption with no authentication.
- WTLS class 2 involves encryption with server authentication.
- WTLS class 3 involves encryption with both server and client authentication.

Server authentication	Requires a server certificate stored at the server side and a root certificate stored at the client side.
Client authentication	Requires a client certificate stored at the client side and a trusted certificate stored at the server side.

A Wireless Identity Module (WIM) can contain both trusted and client certificates, private keys and algorithms needed for WTLS handshaking, encryption/decryption and signature generation. The WIM module can be placed on a SIM card (then referred to as a SWIM card).

Certificates

For secure connections, the phone must store certificates. There are two types of certificates:

Trusted certificate	A certificate that guarantees that a WAP site is genuine. If the phone has a stored certificate of a certain type, it means the user can trust all WAP Gateways that use the certificate. Trusted certificates can be pre-installed in the phone, pre-installed in the SWIM or downloaded from the trusted supplier s WAP page.
Client certificate	A personal certificate that verifies the user s identity. A bank that the user has a contract with may issue this kind of certificate. Client certificates can be pre-installed in the SWIM card.

WIM Locks (PIN Codes)

There are two types of WAP security locks (PIN codes) for a SWIM, protecting the subscription from unauthorized use. The locks should typically be furnished by the supplier of the SWIM.

Access lock	An access lock protects the data in the WIM. The user is asked to enter the PIN code the first time the SWIM card is accessed when establishing a connection.
Signature lock	A signature lock is used for confirming transactions (much like a digital signature).

In the R520 all transactions made with the phone when browsing can be checked. When the user confirms a transaction with a signature lock code, a contract is saved in the phone. The contract contains details about the transaction.

Over-the-Air (OTA) Provisioning of WAP Settings

To simplify the configuration of WAP settings in the R520, all settings can be sent to the phone as an SMS message. This makes it easy for an operator, a service provider or a company to distribute settings for Internet, intranet and/or WAP services access, precluding the user from having to configure the phone manually. This also makes it easy to upgrade services, as users need not manually change configurations for new services.

- The OTA configuration message is distributed via SMS point-to-point.
- The setup information is a binary encoded XML message (WBXML). To receive information about OTA specifications, please contact your local Ericsson representative for consumer products. A configurator that utilizes OTA provisioning can be tested on the Ericsson Mobile Internet.
- The user is alerted about new settings at the end of the browsing session in use. Settings are not changed during an ongoing browsing session.
- OTA provisioning user interaction is limited to receiving and accepting/rejecting the configuration message and selecting the WAP profile to which the setting is to be allocated.
- Security can be handled using a keyword identifier, displayed on the screen as a shared secret between the SMS sender and receiver. (The configuration message should be verified as authentic.)

Other Configuration Methods for WAP Settings

An easy way to perform WAP configuration in the R520 is by using the step-by-step WAP configurator found on the Ericsson Mobile Internet. The configurator utilizes OTA provisioning (above) and is available at http://mobileinternet.ericsson.com.

Another way to perform WAP configuration in the R520 is to use the Ericsson Phone Settings program, available on the CD supplied with the R520. All configuration settings needed to set up the phone to access WAP services can be found on the CD.

Manual configuration can be made by using the menu system in the phone. (Described in the User s Guide.)

WAP Push Services

Examples of WAP services that can be pushed include the following:

- Notifications of new e-mail, voice mail, etc.
- News, sports results, weather forecasts, financial information
- Personal Information Manager (PIM) information (contacts, meeting requests, etc.)
- Smartcard e-cash
- Interactive games

The user can authorize the reception of push services.

Service Indication (SI) and Service Loading (SL) Push Services

There are two different types of push services: Service Indication and Service Loading.

Service Indication (SI). An SI service sends to the browser a text message with a URL of a WAP page. If the user decides to load the URL, normal WAP browsing commences. When an SI is received by the R520, the user can load it immediately, postpone it or delete it. Received SIs are stored in the Push Inbox and can be viewed and loaded at a later time. The Push Inbox displays a list containing the first part of each received message. The list is sorted by action attribute (high/medium/low) or reception time of message.

Service Indication (SL). An SL service sends and displays a WAP page if accepted by the user. If the SL is not accepted, it is loaded and stored in the cache for later use. The user can start the browser and load the page from the cache manually.

POWERFUL MESSAGING

In addition to being able to send SMS and linked messages, the R520 is designed to take advantage of Ericsson s Enhanced Messaging Services (EMS).

- SMS allows the user to send and receive text messages of up to 160 characters (up to 70 characters using Chinese text) through GSM mobile stations.
- Linked SMS messages allow the user to link several SMS messages together to create a longer message (network-dependent).
- EMS allows for the exchange of simple pictures, melodies or ring tones in messages.

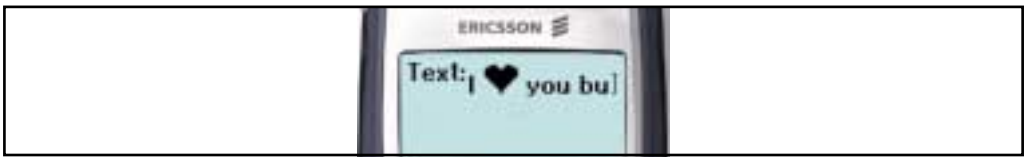
All messaging services support status report, which means that the user can see if a sent message has been delivered or not (network-dependent).

The R520 also allows for saving frequently used text messages as templates. Up to 10 templates consisting of up to 25 characters each can be stored in memory. The R520 also features an SMS counter to keep track of sent SMS messages.

Enhanced Messaging Service (EMS)

Ericsson s Enhanced Messaging Service (EMS) is a powerful enhancement of the SMS standard specified by the 3rd Generation Partnership Project (3GPP). It is supported by major network operators and mobile phone manufacturers. With EMS, the user of the R520 can add life to SMS text messaging in the form of simple pictures, melodies and animations. This gives users new ways to express feelings, moods and personality in SMS messages.

Add life to messages by inserting melodies.



Express feelings and personality by inserting pictures.

In addition to taking advantage of all the benefits of messaging, users can enjoy collecting and swapping pictures, animations, melodies and ring tones. Users can also download these items from online services and/or editing them directly on the R520.

One message may contain several EMS objects, such as a picture, an animation and a sound. The message is limited by size, but if EMS concatenation is used, up to six segments of 128 bytes each can be combined in one message.

Most phones without support for the EMS standard will simply ignore the EMS information and simply display the text portion of the message. This prevents the phone from displaying unreadable contents to users of non-EMS-supported phones.

Pictures and Animations

There are 76 permanently stored pictures in the R520 for expressing different moods and situations. The pictures are grouped by eight different themes to make them easy to find. In addition, the R520 has another 30 empty positions for saving pictures that have been received in incoming messages or created on the R520 with its Picture Editor.

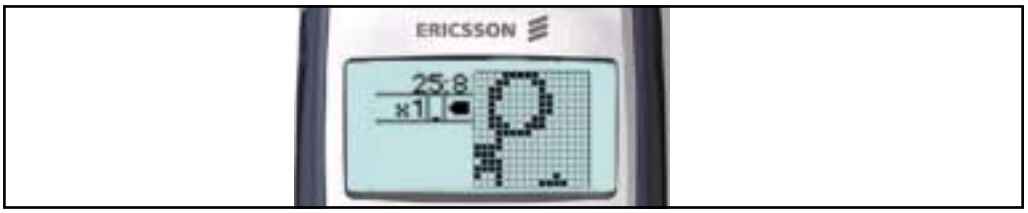
Animations make it possible to further enhance the messaging experience. The R520 includes pre-defined animations for inserting into outgoing messages. In addition, the user can receive user-defined animations in incoming messages.

Sounds and Melodies

Pre-defined sounds, such as chimes high or notify, as well as melodies and ring signals can be inserted into messages. Melodies received in incoming messages as well as those composed with the R520 on its Melody Composer can be stored in *My Melodies* for later insertion in outgoing messages.

Picture Editor

Pictures and symbols can be edited directly on the phone to create new, personal pictures for inclusion in EMS messages.



Available Picture Editor tools include:

- Set line thickness
- Zoom in, zoom out
- Change picture width and height
- Select black or white pen

Melody Composer

The R520 s Melody Composer allows the user to compose or edit melodies and ring tones. Melodies may contain up to 80 notes and span three octaves. As many as 80 melodies can be stored in memory.

MOBILE INTERNET AND E-MAIL

The Mobile Internet offers much more than mobile access to the Internet. It opens up a whole new range of situation-based services — services that give the user anytime, anywhere access to personalized communications, information and entertainment. The R520 affords access to these services as well as to WAP-adapted Internet services. The R520 is also designed to take advantage of new technologies such as mobile positioning, which will create new commercial and productivity solutions.

Data Connections

In order to browse via WAP or use the e-mail program, the user must first establish a connection for data communication. A data connection contains specific settings and parameters to connect to an appropriate server. Multiple data connections can be saved in the R520. Pre-configured data connections can be provided by the operator using OTA provisioning.

Advantages of data connections include the following:

- Once the data connections are defined and named, the user does not have to re-enter them for every connection.
- Individual data settings for working with WAP, e-mail or the Internet can be stored and activated as needed.
- Data connections can be used for both GSM Data and GPRS connection settings.
- Bearer type for WAP and corresponding bearer-specific parameters may be selected.
- Data connections contain all necessary settings and parameters, including modem pool phone number or IP address, user ID and password.

Built-in E-mail Client

The R520 features a built-in e-mail client for sending and receiving e-mail messages, enabling the user to connect to the e-mail account normally used on the corporate network or elsewhere. The same settings used in the e-mail client of the office PC can be used in the e-mail client of the R520. The R520 s e-mail client has several useful features:

- True POP3/SMTP functionality, supporting the majority of e-mail and Web mail servers
- Ability to copy outgoing mail to the e-mail server for future reference
- Ability to attach a photo from a digital camera
- Scheduling of automatic e-mail check
- Multiple e-mail accounts
- Predictive text input (T9 Text Input) for fast and easy typing

Mobile Positioning

The geographic location of mobile subscribers can be used to provide them with location-based information and services. Ericsson s Mobile Positioning System (MPS) gives operators a fast and cost-effective way to establish and roll out location-based services.

For users of the R520, the integration of mobile positioning with WAP services means that a complete range of services and information tools are available.

More information regarding possibilities with and technologies for mobile positioning is available at http://www.ericsson.com/mobilepositioning and at the Ericsson Mobility World, at http://www.ericsson.com/mobilityworld.

MODEM AND AT COMMANDS

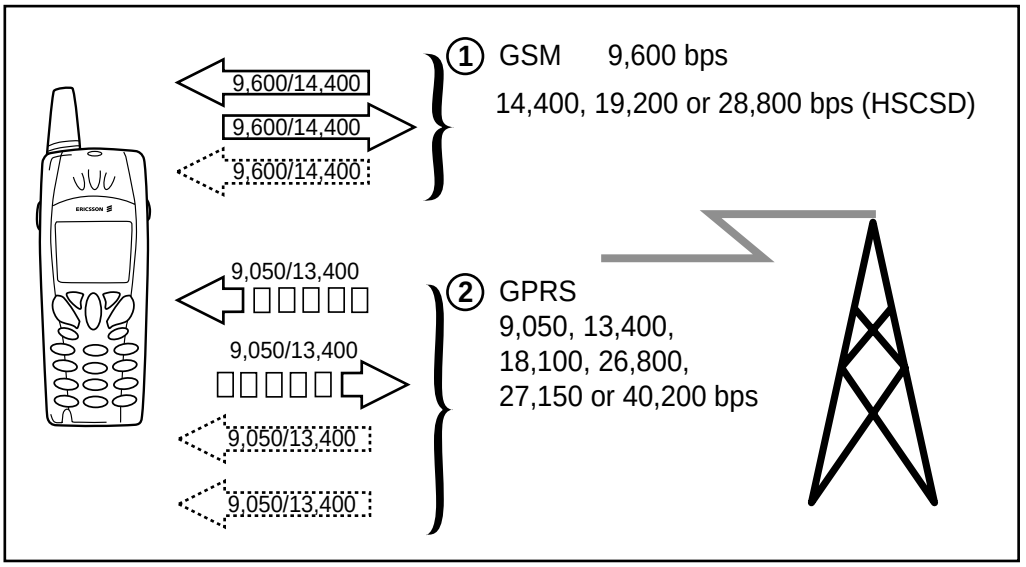
The R520 contains a complete GSM modem, providing data and e-mail communication as well as Internet/intranet access through a connected PC, PDA or other handheld device. Once the PC/PDA is connected to the phone using Bluetooth wireless technology, infrared or a cable, and the appropriate software is installed, the modem in the R520 works much like a PC Card modem or an external modem.

AT commands in the R520 are used for both controlling the data communication between the PC and remote service and configuring and requesting settings and behaviours from a connected PC or PDA.

GSM Data Communication

The R520 s built-in data transmission capability turns the phone into a modem when connected to a PC or PDA. The R520 can establish a data connection anytime, anywhere and at speeds comparable to those of fixed-line networks.

Each GSM channel is divided into eight repeating time slots. A normal GSM call uses only one of these time slots in the GSM channel, giving a data speed of 9600 bps. The R520 supports a more efficient coding scheme, giving data speeds of up to 14 400 bps (depending on the network).



High Speed Data for Greater Speed

High Speed Circuit Switched Data (HSCSD) makes it possible to use two time slots for receiving data. In combination with a more efficient coding scheme, this can increase the receiving data speed to as much as 28 800 bps (network-dependent). Additionally, by using Data Compression (V.42bis), the experienced data rate can be increased by up to four times.

GPRS for High Speed and a Constant Connection

With GPRS, the R520 s online connection is maintained constantly, with data transmitted in packets on an as-needed basis. Pricing of a GPRS connection can depend on use of bandwidth rather than connection time, potentially reducing subscriber costs. When transmitting large amounts of data, bandwidth can be increased automatically to allow faster transmission speeds — up to 40 200 bps for downloaded data.

AT Commands Support

This section outlines the AT commands supported by the R520. This information may be useful to advanced users, enabling them to:

- develop new communications software
- add the R520 to an application s list of compatible modems
- adjust the settings of their mobile telephone and modem

The modem in the R520 supports the V.25ter command set, which is the standard communication set used by modems.

The R520 is compatible with industry extensions ETSI 07.05, 07.07 and 07.10.

Overview of AT Command Functions

AT commands are used to configure the mobile telephone, to request information about the current configuration or operational status of the mobile phone and to test availability for and request the range of valid parameters, when applicable, for an AT command.

The built-in modem can be set in one of three modes of operation:

Off-line Command Mode	The command mode for entry of AT commands (activated when the device is first turned on).
On-line Data Mode	Allows normal operation of the built-in modem, for exchanging data or facsimiles with a remote modem.
On-line Command Mode	For sending AT commands to the built-in modem while remaining connected to a remote modem.

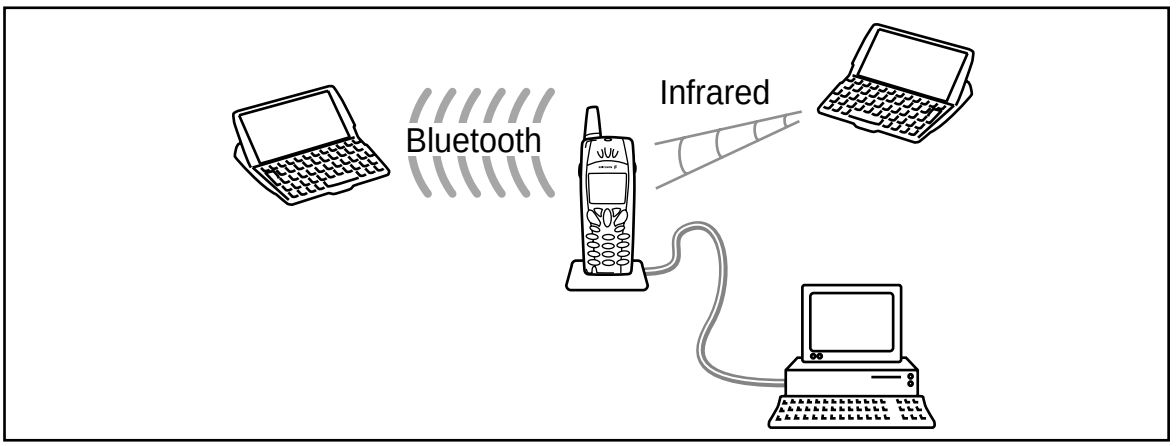
The AT commands in the R520 are grouped as follows:

- Control and Identification
- Call Control
- Interface Commands
- Data Compression
- Mode Management
- Audio Control
- Accessory Menus
- Accessory Authentication
- Voice Call Control
- GSM 07.10
- Accessory Identification
- VAD Support for External VAD
- GSM DTE-DCE Interface Commands
- GSM Call Control
- GSM Data
- GSM High Speed Circuit Switched Data
- GSM Network Services
- GSM USSD

- ¥ GSM Facility Lock
- ¥ GSM Mobile Equipment, Control and Status
- ¥ GSM Mobile Equipment Error Control
- ¥ GSM SMS and PDU Mode
- ¥ GSM GPRS
- ¥ GSM Phone book
- ¥ GSM Clock, Date and Alarm Handling
- ¥ GSM Subscriber Identification
- ¥ Ericsson Specific AT Commands for GSM
- ¥ MMI Settings
- ¥ Voice Control
- ¥ OBEX
- ¥ WAP Browser

SYNCHRONIZE CALENDAR AND PHONE BOOK

In everyday life access to an updated calendar and the schedules of friends and business colleagues is greatly appreciated. To be truly mobile, users must be able to carry their important information with them. Equipping mobile phones with Personal Information Manager (PIM) applications such as calendars, to-do lists and address books gives users access to this important data anywhere and anytime. The information is truly useful when kept up-to-date with that at the office or at home.



The user can save up to 200 appointments and tasks (depending on size) in the calendar of the R520. These can be kept up-to-date with other calendars and PIM applications on a PC, a PDA or on the Internet. The R520s hierarchical phone book is also easily updated in the same way.

Synchronization with Local Calendar and Phone Book

Open standard

Communication with almost any groupware or office program via the open standard IrMC 1.1 (as specified by the Infrared Data Association, reference http://www.irda.org. IrMC 1.1) brings together the following standards:
vCard 2.1 for address book information
vCalendar 1.0 for appointment and to-do information
ObEx (Object Exchange) protocol version 1.0 for data exchange

Bluetooth wireless technology, infrared or cable

The R520 synchronizes using the same protocol, regardless of connection type. It can connect via Bluetooth wireless technology, infrared or cable. (The cable is connected either directly to the phone or to the desktop charger.)

Automatic synch

When infrared or Bluetooth wireless technology is switched on in the phone, the synchronization process starts automatically as soon as the phone is within range of a compatible port on a PC or handheld device. (A suitable synchronization program must be running on the device.)

Intelligent process

A synchronization engine performs the task of synchronizing. For local operations, the synchronization engine is an application running on the desktop computer. The synchronization engine compares, updates and resolves conflicts to make the information in the phone the same as that in the computer.

Synchronization over WAP using SyncML

Synchronizing the R520 with a remote Internet calendar takes place over WAP via SyncML. SyncML is an open synchronization standard designed to interoperate with all workstations, network application servers and mobile information appliances (such as mobile phones, handheld computers, PDAs, etc.), regardless of operating system or platform used. (More information on SyncML is available on the official SyncML web site, http://www.syncml.org.

Hierarchical Phone Book with Contacts

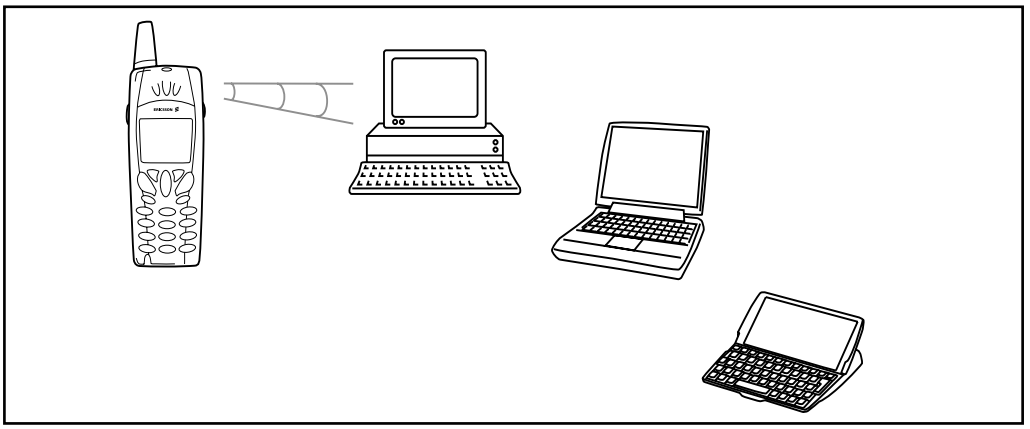
The R520 features a hierarchical phone book, allowing for the storage of name, phone numbers, e-mail address and other information with every contact. The phone book in the R520 is compatible with most groupware and agenda programs, such as Microsoft Outlook, making for smooth synchronization with other devices and terminals.

Synchronization Software and the R520

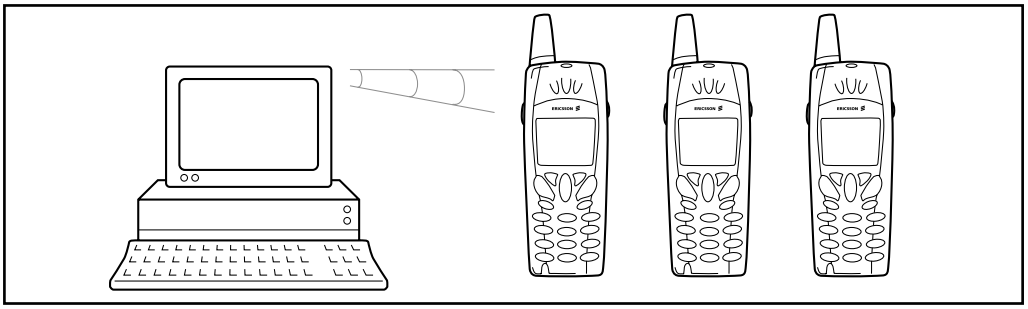
Using the R520 together with a PC equipped with XTNDConnect PC for Ericsson makes for a fast, flexible and easy-to-use synchronization solution. The integration between XTNDConnect PC for Ericsson and Microsoft Outlook provides an embedded menu for one-key synchronization.

- The mobile user typically uses SMS and Phone Book Manager
- The office user typically uses XTNDConnect PC for Ericsson and Phone Settings

The number of units that can intercommunicate is unlimited. One phone can be matched to multiple PCs, ensuring that information on both office and home PCs is synchronized along with that in the R520. This makes it easy, for example, to download a common company phone directory to the phone book in each company R520. With the full version of the synchronization software, other phone types and handheld devices, such as PDAs and Windows CE computers, can also be synchronized.



The R520 can synchronize with an unlimited number of PCs/PDAs.



With the full version XTNDConnect PC, any number of phones can be synchronized with the same PC.

XTNDConnect PC for Ericsson

XTNDConnect PC for Ericsson software is bundled with the R520 and provides a powerful set of functions:

- Phone book and calendar synchronization for the R520
- An embedded synchronization menu in Microsoft Outlook, providing one-key synchronization and allowing the user to control the synch process with easy-to-use settings

PC applications supported by XTNDConnect PC for Ericsson:
Microsoft Outlook 97, 98, 2000

Platforms for using XTNDConnect PC for Ericsson:
Windows 98, 2000, Me (Millennium Edition), Windows NT 4.0
Pentium PC recommended (minimum 386)
32 MB RAM recommended (minimum 16 MB)

Other requirements:
10 MB free hard disk space
Bluetooth wireless technology, infrared or cable connection

Support for XTNDConnect PC for Ericsson is handled by Ericsson.

XTNDConnect PC

Anyone can easily upgrade to the full version of XTNDConnect PC for Ericsson. A number of features and supported applications will then be added:

- Phone book and calendar synchronization for the R520
- Phone Viewer for easy data entry — use a PC to view, create and edit all data stored on the R520

PC applications supported by XTNDConnect PC (full upgraded version):
Microsoft Outlook 97, 98, 2000
Lotus Notes 4.5, 4.6, R5
Lotus Organizer 4.1, 5.0, 97, 97 GS, 6.0
Symantec ACT! 3.05, 4.0, 2000
NetManage Ecco Pro 4.0
GoldMine 3.0, 4.0 (Standard Edition)

Platforms for using XTNDConnect PC:
Windows 98, 2000, Me (Millennium Edition), Windows NT 4.0
Pentium PC recommended (minimum 386)
32 MB RAM recommended (minimum 16 MB)

Other requirements:
10 MB free hard disk space
Bluetooth wireless technology, infrared or cable connection

Handheld devices supported include the R520, palm-sized and handheld devices using Windows CE and PalmOS as well as Casio Personal Organizers and others.

All support for the full version of XTNDConnect PC for Ericsson is handled by Extended Systems Inc.

Ericsson s AirCalendar — for Mobile People

The Ericsson AirCalendar is a synchronization engine with a Web-based calendar featuring tools such as meeting planner, task list, contact list and shared views. The synchronization engine can reside on a user s PC or on an enterprise server.

The R520 can be synchronized with the Ericsson AirCalendar over WAP. No browsing is required. Advantages include the following:

- Entering URL, user name and password in the R520 initiates synchronization.
- The Web-based calendar can be maintained from any browser connected to the Internet.
- Members of a work group can let other members and associates view and enter appointments in the Web-based calendar. The synchronization engine compares appointments to resolve any conflicts.
- The user can request to be automatically notified of any changes to the calendar via e-mail or SMS.

For more information about the Ericsson AirCalendar, refer to http://www.ericsson.com/aircalendar.

INFRARED TRANSCEIVER

Infrared communication creates a data link between two devices through an infrared beam of light. This type of link can be used to connect the R520 with desktop computers, PDAs, Ericsson handheld computers, laptops, digital cameras, other phones (for example, the Ericsson T39) and other hardware supporting the standard. The Infrared Data Association (IrDA) has set the hardware and software standards that form the infrared communication link. The R520 complies with the IrMC 1.1 specification, which defines how mobile telephony and communication devices exchange information. A subset of the IrMC 1.1 specification is used when the R520 communicates via a cable.

Key benefits of using the R520 with its built-in infrared transceiver include the following:

- ¥ True wireless communication
- ¥ Low power consumption
- ¥ Secure data transmission
- ¥ Support for Medium Speed Infrared (MIR) for providing fast communication
- ¥ Support for instant detection of infrared port from a PC running Windows 2000
- ¥ Ability to send and receive e-mail and data on the connected PC or PDA
- ¥ Ability to connect to the Internet or an intranet/LAN from the connected PC or PDA
- ¥ Support for connecting via GPRS networks and/or to a PC running Windows 9x/Windows Me/Windows 2000
- ¥ Ability to manage the phone book and phone settings from a connected PC
- ¥ Ability to attach a photo from a digital camera using IrTranP (Infrared Transfer Picture)
- ¥ Support for exchanging business cards and calendar events with vCard/vCalendar compatible devices
- ¥ Support for exchanging ring signals among compatible devices

Connection via Infrared

IrDA is a point-to-point communication link between two infrared ports. An infrared beam is directed towards a target infrared port and — so long as the two infrared ports are within sight and range — the devices exchange data.

For optimal performance of the R520 s IrDA capability, the phone should be placed within one metre from and at a 30 degree angle to the infrared port of the other device. An advantage of the necessary proximity of devices is reduced risk of transmitting data to other nearby devices. An infrared link is a serial connection, which means that data bits are sent one after another in a long stream. The IrDA—SIR Data Link Standard is a protocol that makes transmission of data faultless. The standard provides a high level of noise immunity, which means that the connection is not affected by fluorescent light, sunlight and electromagnetic fields — making it suitable for the modern office environment.

Connection via Cable

An infrared connection is not always the best solution for connecting to a PC or PDA. Indeed, it is not always possible. The optional DRS-10 cable provides the same type of connectivity between the R520 and other devices.

FUNCTIONS AND FEATURES

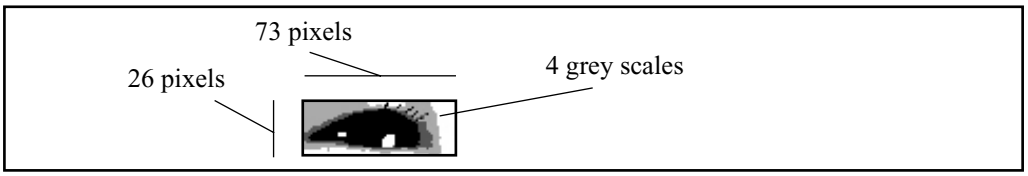
In-Phone Functions and Features

Downloadable Background Pictures

It is possible to use a favourite picture as a background in the R520 s display. The phone contains five pre-installed pictures and one position for a custom picture, which can be downloaded from another phone, from a PC or over WAP. In addition, one picture can be pre-installed by the operator (such as an operator logo).

When the user chooses to display a background picture, the menus, icons and operator name shown in the display are re-composed to leave room in the center of the display for the background picture.

Picture format is GIF with four grey scales (no animation). The displayed picture size is 73 pixels wide by 26 pixels high, measured from the top left corner of the picture. If a picture is too wide (or too high) it will be truncated at the right (or bottom) edge.



The user can design a custom background picture from a photo or an illustration by using editing equipment on a PC. The maximum picture file size for transferring to the R520 is 600 bytes. If a picture file size is too large, it will not be recognised by the phone.

Pictures can be sent to the R520 from a PC or another phone using Bluetooth wireless technology, infrared or cable. Once the picture is received, it can be accepted and saved as a background picture. Downloadable pictures may also be found on WAP sites. Operators can prepare logos or custom pictures for pre-installation in the R520.

Profiles

A profile is a group of settings pre-set to suit a certain environment or function. Profiles can also be used for accessories such as a desktop charger or a portable or vehicle handsfree. They are also useful for handling company integration with call forwarding and other like services. Some phone accessories select a profile automatically. For example, when the R520 is placed in a car handsfree unit, the In car profile is chosen.

The easiest way to set up profiles in the R520 is by using the Ericsson Phone Settings program.

Predictive Text Input (T9 Text Input)

With predictive text input (T9 Text Input), the R520 can recognize the most commonly used words beginning with a certain letter, making the writing of text messages and e-mail quick and convenient (language support dependent). For example, if 2, 6 and 3 are pressed, the word and appears, as this is the most commonly used word with that combination of letters. The user can toggle between predictive and manual text input at any time.

Voice Control

The R520 supports enhanced voice control, useful for handsfree operation. Voice control functions allow the user to:

- Voice dial — call a party by pronouncing the name and number type, e.g., John, home
- Answer and reject calls by voice when using a handsfree kit
- Change profiles by voice
- Record or listen to voice memos with voice commands
- List caller names by voice
- Activate voice control with a magic word

The Magic Word

The user can record a magic word and use it as a voice command to allow handsfree access to voice control functions. Instead of pressing and holding YES, for example, the user says the magic word followed by one of the recorded voice commands. The magic word is especially suitable when driving a car with a car handsfree kit installed, as external power is used instead of the R520 s battery power. (Activating the magic word consumes more power than when in normal standby mode.) The magic word can also be used when the phone is connected to a portable handsfree.

Hierarchical Phone Book

Companies and other organizations may have need for multiple R520s with a common set of phone book entries. There are two ways to enter a common set of phone book entries:

- Use the Ericsson Phone Book and SMS Manager on a PC to prepare the common phone book entries. Then send the phone book entries from the PC to each R520.
- Prepare the phone book on one SIM card in one R520. Copy the contents from this SIM card to the R520 s memory. Place into this R520 the SIM cards of all other R520s, copying the contents to them from memory.

Voice Memo

Voice memo, accessed through the regular menu, allows for the recording of either speaking party s voice. The user may also record short voice memos. Recording time is 92 seconds in normal quality mode and 36 seconds in high quality mode. Note that voice memo use may be restricted in certain areas. Please check the appropriate regulations before using this function.

Calendar Entry Exchange

Calendar entries can be exchanged with other programs by virtue of the vCalendar specification. Using vCalendar, events, appointments, tasks and meeting information can be beamed to and from any IrDA-equipped device with vCalendar support.

Ring Signal Exchange

The R520 supports exchange of ring signals with other compatible phones.

More In-Phone Functions and Features

- Active Flip answering
- Alarm clock
- Background light blue
- Bluetooth built-in wireless technology

- Bluetooth wireless technology games
- Built-in modem
- Calendar
- Cable functionality
- Contacts
- Calculator
- Code memo
- Data transfer
- Ericsson ring signal logotype (to recognise an Ericsson phone by its ring signal)
- External antenna connector
- Full graphic display (4 grey scales and 5 rows of text)
- Games (including Bluetooth-enabled games)
- Infrared functionality
- Last dialled numbers
- Melody composer
- Missed calls
- Power gauging
- Received calls list
- Ring signal composition
- Status lists
- Status view
- Stopwatch
- SIM Application Toolkit
- Tasks
- Timer
- Vibrating alert
- Voice answering
- Voice dialling
- WAP browser and services

Network-Dependent Features

Business Card Exchange

Business cards can be exchanged with other devices by virtue of the vCard specification. Business card information can include name, phone number, e-mail address, etc. Laptops, PDAs, phones and other devices equipped with IrDA or Bluetooth wireless technology and supporting vCard are able to beam business cards.

Fixed Dialling and Restricted Calls

Fixed dialling allows for restricting certain phone calls by using a pre-set number of digits, for example area codes, to define allowable calls. Fixed dialling makes use of PIN2 and requires fixed dial fields on the SIM Card. Restricted calls allows for blocking of outgoing or incoming calls — for example, international calls.

More Network-Dependent Features

- ¥ High Speed Data
- ¥ Advice of charge charging
- ¥ Advice of charge information
- ¥ Automatic time zone
- ¥ Call barring
- ¥ Call forwarding
- ¥ Call hold
- ¥ Call screening
- ¥ Call transfer
- ¥ Call waiting
- ¥ Calling Line Identification (CLI)
- ¥ Closed user groups
- ¥ Conference calls
- ¥ Enhanced Full Rate Speech Coding (EFR)
- ¥ e-GSM
- ¥ Full Rate Speech Coding (FR)
- ¥ GPRS (3+1 time slots)
- ¥ Triple band — GSM 900/1800/1900
- ¥ GSM phase 2+
- ¥ HR speech coding
- ¥ International roaming
- ¥ Phone book on SIM
- ¥ SIM Application Toolkit
- ¥ Two line service/Alternate Line Service (ALS)
- ¥ Unified messaging
- ¥ Voice mail
- ¥ WAP 1.2.1

SIM APPLICATION TOOLKIT

The SIM Application Toolkit (SIM AT) enables GSM, SMS and USSD transport-based applications to be distributed on smartcards. For companies, operators and service providers, this is a powerful way to provide programs and services to users, as all necessary setup and programming is sent over the air directly to users phones.

In the R520 a separate menu is available for functions residing on the SIM card. These can include submenus for controlling functions as well as functions for initiating calls, sending data and displaying information.

WAP, on the other hand, represents an Internet-based method for providing applications independent of network technology. Applications and content are kept centrally on Web servers and downloaded as required. There is some overlap between WAP and SIM AT (for example, WAP is particularly good for providing applications that have an HTML version for desktop use), and work is currently underway to build interfaces between the two technologies.

SIM AT Services Supported by the R520

Service	Mode		Support in R520
CELL BROADCAST DOWNLOAD			Yes
DISPLAY TEXT	General: Support for packed and unpacked format in SMS default alphabet as well as UCS2 alphabet.		Yes
	bit 1:	0 = normal priority	Yes
		1 = high priority	Yes
	bit 8:	0 = clear message after a delay	Yes
		1 = wait for user to clear message	Yes
GET INKEY	General: The GET_INKEY requires that the user press Yes to confirm his/her choice.		Yes
	bit 1:	0 = digits (0-9, *, # and +) only	Yes
		1 = alphabet set	Yes
	bit 2:	0 = SMS default alphabet	Yes
		1 = UCS2 alphabet	Yes
	bit 3:	0 = character sets defined by bit 1 and bit 2 are enabled.	No
	and	1 = character sets defined by bit 1 and bit 2 are disabled and the Yes/No response is requested.	No

Service	Mode		Support in R520
GET INPUT	General: Number of hidden input characters.		20
	bit 1:	0 = digits (0-9, *, # and +) only	Yes
		1 = alphabet set	Yes
	bit 2:	0 = SMS default alphabet	Yes
		1 = UCS2 alphabet	Yes
	bit 3:	0 = ME may echo user input on the display	Yes
		1 = user input not to be revealed in any way (see note)	Yes
	bit 4:	0 = user input to be in unpacked format	Yes
		1 = user input to be in SMS packed format	Yes
	bit 8:	0 = no help information available	Yes
		1 = help information available	No
MORE TIME			Yes
POLLING OFF			Yes
POLL INTERVAL			Yes
PROVIDE LOCAL INFORMATION	’00’ = Location Information (MCC, MNC, LAC and Cell Identity)		Yes
	’01’ = IMEI of the ME		Yes
	’02’ = Network Measurement results		No
	’03’ = Date, time and time zone $(DTTinPLI)$		No
REFRESH	General: The reset option requests the user to wait while the phone restarts.		Yes
	’00’ =SIM Initialization and Full File Change Notification		Yes
	’01’ = File Change Notification		Yes
	’02’ = SIM Initialization and File Change Notification		Yes
	’03’ = SIM Initialization		Yes
	’04’ = SIM Reset		Yes
SELECT ITEM			Yes
SEND SHORT MESSAGE	bit 1:	0 = packing not required	Yes
		1 = SMS packing by the ME required	Yes
SEND SS			Yes

Service	Mode	Support in R520
SEND USSD		Yes
SET UP CALL	General: Capability configuration	Yes
	Setup speech call CallParty Subaddress	No
	DTMF support	Yes
	’00’ = set up call, but only if not currently busy on another call	Yes
	’01’ = set up call, but only if not currently busy on another call, with redial	Yes
	’02’ = set up call, putting all other calls (if any) on hold	Yes
	’03’ = set up call, putting all other calls (if any) on hold, with redial	Yes
	’04’ = set up call, disconnecting all other calls (if any)	Yes
	’05’ = set up call, disconnecting all other calls (if any), with redial	Yes
SET UP MENU		Yes
SMS PP DOWNLOAD		Yes
START MENU		Yes

User Interaction With SIM AT

DISPLAY TEXT: A text string of up to 160 characters (80 UCS coded) is supported.
Text clearing times: 10—20 seconds. 60-second timeout limit for the user to clear the text.
Key responses: Long NO — Proactive session terminated by user.
NO — Backward move in proactive session.
Any other key clears display if command is performed.

GET INKEY: Prompt for a one-character input. Pressing YES without entering a character gives warning message Minimum 1 character .
Key responses: CLR clears current character.
Long NO terminates the proactive session.
NO — Backward move in proactive session.
YES — Command performed successfully.

GET INPUT: Prompt for character input. Pressing YES without entering a character gives warning message Minimum no characters . The phone will refuse to accept further input when maximum response length is exceeded.
MMI Maximum Response lengths:
Digits Only — 160 characters
SMS default alphabet characters — 160 characters
Hidden Characters (Digits Only) — 20 characters
Key responses: CLR clears current character/characters.
Long No terminates the proactive session
NO — Backward move in proactive session
YES — Command performed successfully

REFRESH: When a Refresh Reset command is executed by the phone, the user is prompted Please wait , and then the phone will restart.

SELECT ITEM: Scroll to highlight item for selection. The maximum number of items supported by the phone within one Select Item command is 30.

Key responses: Down arrow — Scroll down list
Up arrow — Scroll up list
Long No terminates proactive session
NO — Backward move in proactive session
YES — Command performed successfully

SEND SHORT MESS.: Default message Sending message Please wait can be replaced for the Alpha Identifier text or suppressed completely if no text is provided. Responses are MESSAGE FAILED and MESSAGE SENT .

Key responses: Long No or NO terminates the active session.

SET UP CALL: If the ME is on a call when the command Set up Call — putting all other calls on hold is sent, the user will see the text Setting up a call current call will be held . If the YES key is pressed, the current call will be put on hold and the new call set up. If the ME is on a call when the command Set Up Call — disconnecting all other calls is sent, the user will see the text Setting up a call current call will be disconnected . If the YES key is pressed, the current call will be disconnected and the new call set up.

SET UP MENU: Incorporates a SIM Application Toolkit Menu Item into the ME s main menu structure. From the standby display the right or left arrow buttons can be pressed to select Menu Items. (Note: The SIM AT menu option is found in the Extras menu.)

If an Alpha Identifier is supplied in the Set Up Menu command, it is used as the SIM AT entry in the ME s main menu. If no alpha identifier is supplied and only one item provided, then this item is used as header. If no alpha identifier is supplied and several items are found in the menu, a default title is used. If the SIM AT Menu Item is selected using the YES key, all the items sent in the Set Up Menu command will be available for selection. A limit of 30 menu items has been set for this command.

Key responses: Down arrow — Scroll down list
Up arrow — Scroll up list
Side key — Scrolls the menu
YES — Envelope (Menu Selection)

TERMINOLOGY AND ABBREVIATIONS

3GPP	3rd Generation Partnership Project
API	Application Programming Interface
Beam	Exchanging information via an infrared link
Bearer	The method for accessing WAP from the phone, for example GSM Data (CSD) or SMS
bFTP	binary File Transfer Protocol
Bluetooth	A fast, point-to-multipoint radio connection technology for wireless connection among devices. For more information see http://www.bluetooth.com.
Bookmark	A URL and header/title stored in the phone
Browsing session	The period from the first access of content until the termination of the connection
Calling Line Identification (CLI)	Displays the number of the calling party (not all numbers can be displayed; service is network-dependent)
Card	A single WML unit of navigation and user interface; may contain information for the user, instructions for input, etc.
CGI	Common Gateway Interface
CS	Circuit-Switched
CSD	Circuit-Switched Data
Deck	A collection of WML cards
DTMF or Touch Tone	Codes sent as tone signals; used for telephone banking, accessing an answering machine, etc.
e-GSM (Extended GSM)	New frequencies specified by the European Radio communications Committee (ERC) for GSM use when additional spectrum is needed, allowing operators to transmit and receive just outside GSM s core 900 frequency band
EFR	Enhanced Full Rate (speech coding)
ETSI	European Telecommunications Standards Institute
FR	Full Rate (speech coding)
Gateway	Translates requests from a WAP protocol stack to a WWW protocol stack (HTTP and TCP/IP) and Web content into binary-encoded formats to reduce the size and number of packets traveling over a wireless data network
GIF	Graphics Interchange Format
GPRS	General Packet Radio Services
GSM	(Global System for Mobile Communications) The world s most widely-used digital mobile phone system, now operating in over 100 countries around the world, particularly in Europe and Asia-Pacific
GSM 900	A digital network working on the 900 MHz frequency
GSM 1800	A digital network (also known as DCS 1800 or PCN), used in Europe and Asia-Pacific, working on the 1800 MHz frequency.

HDML	Handheld Device Markup Language
HDTP	Handheld Device Transport Protocol
HR	Half Rate (speech coding)
HSCSD	High Speed Circuit Switched Data
HTML	HyperText Markup Language
HTTP	HyperText Transfer Protocol
Image	WBMP or GIF
IrMC	Infrared Mobile Communications standard
IrDA	Infrared Data Association
IrTranP	A specification for sending pictures via infrared
ISP	Internet Service Provider
ITTP	Intelligent Terminal Transfer Protocol
LAN	Local Area Network
ME	Mobile Equipment
Micro browser	Accesses and displays the Internet contents in a mobile phone, much like an ordinary computer browser
MIR	Medium speed infrared
MMI	Man-Machine Interface
MS	Mobile Station
MT	Mobile Termination
OTA (Over-the-Air)	Configuration for sending phone settings over the network, reducing the need for the user to configure the phone manually
PDA	Personal Digital Assistant
PDP	Packet Data Protocol
Phone book	A memory area in the mobile phone or SIM card where phone numbers can be stored and accessed by name or position
PIM	Personal Information Management
SC	Service Centre (for SMS)
Service Provider	A company that provides services and subscriptions to mobile phone users
SI	Service Indication
SL	Service Loading
SIM card	A card that must be inserted into any GSM-based mobile phone and containing subscriber details, security information and memory for a personal directory of numbers.
SIR	Serial Infrared
SMS	A store-and-forward service allows messages of up to 160 characters to be sent and received among mobile phones via the network operator s message centre.
SS	Supplementary Services
SWIM card	A SIM card with a WIM module
TCP/IP	Transmission Control Protocol/Internet Protocol

TE	Terminal Equipment
TLS	Transport Layer Security
Triple Band GSM 900/1800/1900	Allows the mobile phone to work with GSM 900, 1800 and 1900 systems
URL	Uniform Resource Locator
USSD	Unstructured Supplementary Services Data
VAD	Voice Activated Dialling
VAS	Value Added Service
vCalendar	A transport- and platform-independent format for exchanging and scheduling calendar information for use in PIMs, PDAs and group schedulers (specified by IETF)
vCard	Automates the exchange of personal information typically found on a traditional business card (specified by IETF)
WAE	Wireless Application Environment
WAP	Wireless Application Protocol
WAP Application	A collection of WML cards, with the new context attribute set in the entry card
WAP service	A WML application residing on a Web site
WBMP	WAP Bitmap
WBXML	Wireless Binary Extensible Markup Language
WDP	Wireless Datagram Protocol
WIM	Wireless Identity Module
WML	(Wireless Markup Language) A markup language for authoring WAP services, similar to HTML
WMLScript	A scripting language for enhancing WAP services, similar to JavaScript
WSP	Wireless Session Protocol
WTLS	Wireless Transport Layer Security
WWW	World Wide Web
XML	Extensible Markup Language

RELATED INFORMATION

Documents

- The R520 User s Guide
- WAP June2000 (WAP 1.2.1) Specification
- Mobile Phones R520, T20, A2628 Developers Guidelines WAP Services
- AT Command Reference Manual

Software

- XTNDConnect PC for Ericsson (bundled with the phone)
- XTNDConnect PC (upgraded version from Extended Systems Inc.)

Links

- http://mobileinternet.ericsson.com— a site for the mobile phone user
- http://www.ericsson.com/wap — information on WAP
- http://www.ericsson.com/aircalendar — information on the Ericsson AirCalendar
- http://www.ericsson.com/mobilityworld — information, tools, white papers and software updates on Ericsson products and technologies
- http://www.3gpp.org — home of the 3rd Generation Partnership Project
- http://www.irda.org — home of the Infrared Data Association
- http://www.etsi.org — home of the European Telecommunications Standards Institute
- http://www.wapforum.org — home of the WAP Forum
- http://www.gprsworld.com
- http://www.extendedsystems.com
- http://www.bluetooth.com — the official Bluetooth Special Interest Group Web site
- http://www.imc.org
- http://www.syncml.org — the official home of the SyncML Initiative

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APPENDIX: TECHNICAL SPECIFICATIONS

The consumer pack includes:

1 Mobile Phone R520
1 Ultra Slim Battery BUS-11 (600 mAh)
1 Travel Charger CTR-10
1 Clip
1 Ericsson service and support leaflet
1 User documentation
1 Accessory leaflet
1 CD ROM (including Ericsson PC programs, MS Outlook and XTNDConnect PC synchronization software)

General

Product name:	R520
System:	GSM phase 2 recommendations. GSM 900 (CTR 19 and CTR 20), GSM 1800 (CTR 31 and CTR 32) and GSM 1900 (NATWG 03), e-GSM supported
Speech coding:	HR, FR, EFR supported where available, for high speech quality
SIM card:	Small plug-in card, 3V or 5V type
Type number:	1130101-BV

Exterior Description

Size:	130 x 50 x 16 mm
Weight:	without battery: 82 grams with High Capacity Battery BHC-10: 136 grams with Slim Battery BSL-11: 120 grams with Ultra Slim Battery BUS-11: 105 grams
Display size:	101 pixels wide, 67 pixels high
Graphic display:	4 grey scales
Text size:	3 sizes (depending on software version)
Text rows:	up to 6 rows of text, depending on text size
Colour:	Lightning Copper
Keypad:	19 keys and a slider on the side

Ambient Temperatures

Operating	Max: +55°C, Min: -10°C
Storage	Max: +70°C, Min: -40°C
Charging	Max: +35°C, Min: 0°C

Supported Man-Machine Interface (MMI) languages

Depending on software in the phone, the following languages are supported:

Arabic (AR), Brazilian Portuguese (PB), Bulgarian (BG), Canadian French (CF), Czech (CS), Chinese traditional (ZH), Chinese simplified (ZS), Chinese Taiwan (ZT), Croatian (HR), Danish (DA), Dutch (NL), English (EN), Estonian (ET), Farsi (FA), Finnish (FI), French (FR), German (DE), Greek (EL), Hebrew (IW), Hindi (HI), Hungarian (HU), Indonesian-Bahasar (IN), Italian (IT), Latin American Spanish (XL), Latvian (LV), Lithuanian (LT), Malay (MS), Norwegian (NO), Philippine-Tagalog (TL), Polish (PL), Portuguese (PT), Romanian (RO), Russian (RU), Serbian (SR), Slovakian (SK), Slovenian (SL), Spanish (ES), Swedish (SV), Thai (TH), Turkish (TR), US English (AE), Vietnamese (VI)

Performance and Technical Characteristics

Dimension	GSM 900/E-GSM 900	GSM 1800	GSM 1900
Frequency range	TX: 880 — 914 MHz RX: 925 — 959 MHz	TX: 1710 — 1785 RX: 1805 — 1880	TX: 1850 — 1910 RX: 1930 — 1990
Channel spacing	200 kHz	200 kHz	200 kHz
Number of channels	174 Carriers *8 (TDMA)	374 Carriers *8 (TDMA)	299 Carriers *8 (TDMA)
Modulation	GMSK	GMSK	GMSK
TX Phase Accuracy	< 5… RMS Phase error (burst)	< 5… RMS Phase error (burst)	< 5… RMS Phase error (burst)
Duplex spacing	45 MHz	95 MHz	80 MHz
Frequency stability	+/- 0.1	+/- 0.1	+/- 0.1
Voltage operation (nominal)	3.6 Volts	3.6 Volts	3.6 Volts
Transmitter RF power output	33 dBm Class 4 (2W peak)	30 dBm Class 1 (1W peak)	30 dBm Class 1 (1W peak)
Transmitter Output impedance	50 ‰	50 ‰	50 ‰
Transmitter Spurious emission	< -36 dBm up to 1 GHz < -30 dBm over 1 GHz (according to GSM spec.)	< - 30 dBm (according to GSM spec.)	< - 30 dBm (according to GSM spec.)
Receiver RF level	Better than — 102 dBm	— 102 dBm	— 102 dBm
Receiver RX Bit error rate	< 2.4%	< 2.4%	< 2.4%

Current Consumptions, Talk and Standby Times

Dimension	Value in GSM 900	
Transmission current	54.9 mA (min) 215 mA (max)	
Standby current	1.95 mA (min), (paging rate 9, 1 neighbour present) 3.75 mA (max), (paging rate 2, 16 neighbours present)	
High Capacity Battery BHC-10 (1400 mAh)	Talk time	6.5 to 25.5 hours
	Standby time	375 to 715 hours (up to 29 days)
Slim Battery BSL-11 (850 mAh)	Talk time	4 to 15.5 hours

Dimension	Value in GSM 900	
	Standby time	225 to 435 hours (up to 18 days)
Ultra Slim Battery BUS-11 (600 mAh)	Talk time	2.5 to 11 hours
	Standby time	160 to 300 hours (up to 12 days)

Speech Coding

Dimension	Full rate	Enhanced full rate
Type	RPE/LPC with LTP	ACELP
Bit rate	13.0 Kbp/s	12.2 Kbp/s
Frame duration	20 ms	20 ms
Block length	260 bits	244 bits
Class 1 bits	182 bits	
Class 2 bits	78 bits	

CPHS Compliancy

The Common PCN Handset Specification (CPHS) is an industry standard that defines terminal and SIM functionality in addition to the standard GSM specifications. Several handset manufacturers have implemented these features, but because they remain outside the core GSM/3G specifications, their use is limited.

The R520 is manufactured to comply with CPHS. However, a detailed and formal specification and compliancy declaration is not available in this document. Please refer to Ericsson for more information.

Bluetooth Wireless Technology Technical Data

Dimension	Support in the R520
Bluetooth capability statement	This product is manufactured to comply with the Bluetooth specification 1.1. However, because qualification for the 1.1 specification is not yet available, this product has been formally qualified according to the Bluetooth specification 1.0b.
Bluetooth functions	Generic Access Profile Serial Port Profile Headset Profile Dial-up Networking Profile Fax Profile Generic Object Exchange Profile Object Push Profile Synchronization Profile
Coverage area	Up to 10 metres (33 feet)
Transmission power	1mW (0dBm)
Frequency band	2.4 GHz - the unlicensed ISM band
Power consumption	Standby current: < 0.3 mA Voice mode: 8-30 mA Data mode average: 5 mA [0.3-30 mA, 20 kbps, 25%]
Data transmission rate	up to 108,800 bps with one time slot

WAP Browser Technical Data

Feature	Support in the R520 WAP browser
Back to previous page	Yes
Bearer type GPRS (IP)	Yes
Bearer type GSM Data (IP)	Yes, ISDN and analog
Bearer type SMS	Yes (point-to-point)
Bookmarks	Yes, up to 25 named bookmarks for easy access to frequently visited pages
Bookmark Export/Import	Yes, can be sent and received as link using SMS
Cache	Yes (size 8 kbyte).
Character sets *	UTF8 (Default), USAASCII, Latin1, UCS2
Clear cache	Yes
Colour	High resolution grey scale display (four grey scales)
Home page	Yes, up to 5 different, one for each WAP profile
Digital signatures (security)	Yes, WML Script Crypto API - Sign Text
Hyperlinks in Text	Yes, highlighted by inverse video
Hyperlinks in Images	Yes, indicated by a frame

Feature	Support in the R520 WAP browser
Image Animation	No
Image Formats	GIF (interlaced and non-interlaced), WBMP, no transparent layers
Network Settings	Up to 5 different settings available by selecting WAP profile (Intranet, Internet, Banking, Gateway, etc.)
OTA Support	Yes
PPP Authentication	PAP, CHAP and MS-CHAP
Reload page	Yes
Tables	Yes
User Agent Profiles	Yes, list of client characteristics, e.g., display size
WAP/WML	WAP June2000 (WAP 1.2.1)
	** When creating WML applications, it is recommended to save the page contents as UTF8 and to clearly indicate this in the pages before publishing. This ensures that the contents of the application can be viewed regardless of character sets used in gateways and the phone. All characters are not supported in all phones. The software version depends on the phone's associated market. Also, please note that the phone may not support input on a WAP service that uses certain characters (languages), even if those characters are supported for browsing in the phone.*
WAP profiles	5 WAP profiles, each with its own settings
WTLS (security)	Yes, WTLS Class 1 - Encoding WTLS Class 2 - Encoding + Server Authentication, Root Certificates needed in phone WTLS Class 3 - Encoding + Server Authentication, Client Certification, Root and Client Certificates needed in phone

GPRS Technical Data

Dimension	Support in R520
Data rates	Multislot class is 8 supported. CS-1, CS-2 9 050 bps, 13 400 bps supported (network-dependent).
Downlink data rate	Up to 40 200 bps for packet data communication, using 3 time slots in coding scheme CS-2.
Uplink data rate	Up to 13 400 bps for packet data communication, using 1 time slot in coding scheme CS-2.
Mode of operation	Class B and Class C modes of operation supported. Network Operation Modes I, II and III handled by mobile. It is possible for the user to choose which of the circuit-switched and GPRS services should be favoured.
R Reference point	Physical layer: Support for IrDA, Bluetooth 1.0 and RS232. PPP is supported as L2 layer in the R reference point. Authentication algorithms PAP, CHAP and MS-CHAP are supported.
IP connectivity	PDP type IP is supported. IP termination in mobile or TE (laptop, PDA) is supported. TCP/IP header compression is supported.
Application	WAP over GPRS supported (UDP/IP and GPRS-SMS). SMS over GPRS (SMS-MT, SMS-MO) supported.
QoS	QoS negotiation supported. Reliability class 1—5 supported. Mean and peak throughput rate limited by multislot class 8 and CS-4.
PDP context	Up to 10 PDP context descriptions stored in mobile. PDP context description is edited via application in mobile, AT-command or via OTA. Simultaneous PDP contexts not supported. Network requested PDP context not supported.
SIM	GPRS aware, as well as GPRS non-aware, SIMs are supported.

Built-in GSM Data Modem Technical Data

Dimension	Support in the R520	
Standards	AT commands industry standard, ETSI 07.05 and 07.07 and 07.10, V.25ter command set supported	
Data rates, Circuit Switched (CSD)	Download data rate	Up to 19 200 or 28 800 bps (depending on base rate) no compression, with V.42bis compression up to four times higher transmission rates depending on the data type

Dimension	Support in the R520	
	Upload data rate	Up to 9600 or 14 400 bps (depending on base rate) for GSM Data communication, no compression with V.42bis compression up to four times higher transmission rates depending on the data type
Data rates, GPRS	See GPRS Technical data	

Infrared Transceiver Technical Data

Dimension	Support in the R520	
Standards	IrDA DATA with secondary implementation of IrLAP 1.0 and IrDA-Ultra, IRMC 1.1 except RTCON (Real Time Control Protocol) AT commands industry standard, ETSI 07.05 and 07.07	
Coverage area	Up to 1 metre (3.3 feet)	
Power consumption	Slightly increased depending on type of communication	
Compatibility	Computer	IrDA equipped computers using Win95/98/NT 4.0, vCard/vCalendar support to exchange business cards/calendar entries
	PDA	Ericsson MC218 and other IrDA equipped PDAs running Windows CE, EPOC32 or PalmOS, vCard/vCalendar support to exchange business cards/calendar entries
	Phone	R520 to exchange business card, calendar entries and ring signals, as well as other vCard/vCalendar compliant phones
Data transmission rate	Max speed between phone and IrDA device (e.g., PC, another phone) SIR: up to 115,200 bps MIR: up to 1,152,000 bps	

Connection via Cable

The optional DRS-10 cable supports a subset of the signals in the RS-232 standard, as detailed below. The cable connection supports autodetect (automatic detection of baud rate, parity, data bits and stop bits used by host device). The maximum data speed is up to 230 400 bps.

Support of HW and SW flow control: Yes
Support for AT commands industry standard, ETSI 07.10 - multi channels: Yes

Signal in RS-232	Support in DRS-10
CD (Carrier Detect)	No. Set statically
CTS (Clear To Send)	Yes

Signal in RS-232	Support in DRS-10
DSR (Data Service Ready)	Statically connected with DTR
DTR (Data Terminal Ready)	Statically connected with DSR
GND (Signal Ground)	Yes
RI (Ring Indication)	No. Set statically
RTS (Request To Send)	Yes
Rx (Received Data)	Yes
Tx (Transmitted Data)	Yes

Enhanced Messaging Service (EMS) Technical Data

EMS Feature	Support in R520		
Concatenation (linked SMS)	Yes, 6 parts, each message up to 128 bytes of data		
iMelody format support		iMelody notation	Melody Composer notation
	Note range: (If a note is out of range the melody will not be played)	From *3c to *5b	From c to ++b (From octave 3 note c to octave 5 note b)
	Durations: 150 ms	3	c
	225 ms	2	c.
	300 ms	1	C
	450 ms	0	C.
	Flat note:	Yes, &	(b)
	Sharp note:	Yes, #	#
	Rest:	Yes, r3 (r2, r1, r0)	p (p., P, P.)
	Beat:	No	
	Style	No, (S)	
	Volume modifiers:	No, (V+, V-)	
	Volume:	No, (V)	
	Duration Specifier:	No, (.:;)	
	Led, Vibe, Backlight, Repeat	No	
Include melody in message	Yes, according to iMelody v1.0 format		
Include picture in message	Yes		
Melody composer	Yes, up to 8 user defined melodies and ring tones in My Melodies, each melody up to 80 notes long. Four note durations available.		
Picture editor	Yes, edit My Pictures in the display using black or white pen, line thickness, zoom in, zoom out, picture size.		

EMS Feature	Support in R520		
Picture, receive to phone	Fixed size (WxH in pixels):		Small: 16x16, Large: 32x32
	Variable size. **Note:** The total product of Width and Height must never exceed 1024 pixels.	Width in pixels: (Pictures wider than display are truncated.)	In multiples of 8 pixels up to the screen width (i.e. 8, 16, 24, 32, 40, 48, 56, 64, 72, 80, 88, 96)
		Height in pixels:	from 1 to 1024
Picture, edit a picture saved in My Pictures	Fixed and variable sizes according to Pictures, received to phone in this table. The picture size depends on the picture format when it was saved to My Pictures.		
Picture, create a new picture in My Pictures	User defined size	Width in pixels:	8, 16 or 32
		Height in pixels	8, 16 or 32
Play animation on focus	Yes		
Play melody on focus	Yes		
Pre-defined animations	Yes, 6 animations: Ironic, Glad, Sceptic, Sad, WOW!, Crying		
Pre-defined pictures	Yes, 76 pre-defined pictures grouped by themes		
Pre-defined sounds	Yes, 10 sounds: Chimes high, Chimes low, Ding, TaDa, Notify, Drum, Claps, FanFare, Chord high, Chord low		
Text templates	Yes		

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